

CERTAIN PLANT SPECIES OF THE CANYON OF
HURRICANE CREEK, WALLOWA
COUNTY, OREGON

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From the geologist's standpoint the Wallowa Mountains present the most interesting and diversified section of Oregon. Floristically they are no less noteworthy. The boundaries of the Wallowa mountain area are rather vague. In the broader sense the area embraces all of Wallowa County except the northwest corner, a considerable portion of eastern Union County and a strip of northern Baker County. Between six and seven hundred square miles of this territory, including what are commonly known as the high Wallowas, and the territory eastward to the Snake River, are of exceptional botanical interest. For the most part this is an extremely rugged region with deep, narrow canyons, precipitous slopes, numerous small lakes, and high peaks reaching an altitude of 10,000 feet.

The geological history of the Wallowa Mountains is extremely complex, but scarcely concerns us in the present connection. There are large exposures of Permian metamorphosed lavas, Upper Triassic crystalline limestone, great areas of quartz diorite (Cretaceous) and equally large areas of Tertiary Columbia River basalt mantling the slopes or even covering the summits of many of the high peaks. The floors and lower slopes of many deep canyons and small valleys are covered with Quaternary morainic material, mostly water-worn gravel and small boulders mixed with alluvial deposits.

As to their origin, the Wallowas form an outlying island of the Rocky Mountain system, and they present a larger exposure of Paleozoic and early Mesozoic formation at higher altitudes than occurs elsewhere in the state. These two circumstances determine to a great extent the character of the flora. The number of recorded species of Oregon plants found only in the Wallowas is very large. While not a few of these are endemics, most of them show a close relationship with Rocky Mountain species. In many cases the difference is subspecific, the distinction often being very slight.

While the actual distance of the high Wallowas from the Rocky Mountains is not great, their separation from the latter, at least as far as the distribution of alpine species is concerned, is very effectual. The extremely deep gorge of the Snake River, with no high peaks on the Oregon side for nearly 20 miles, must constitute a complete barrier to all high altitude forms except under unusual conditions. Added to the relatively rare accident

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of seed transportation across the intervening depression, the uncertainty of deposition on favorable soil with other suitable environmental conditions in so extensively barren a terrain make the chances of successful establishment of a species in the new territory very slight. The degree to which the migrant forms differ from the probable parent stock may thus be taken, in general, as an indication of the relative remoteness of the date of their first arrival. Of these differences, as stated above, we find varying degrees. At least some of these conclusions are well illustrated by a rather detailed examination of the vegetation of a very small but exceptionally favorable section of Wallowa Mountain territory recently made by the writer.

The period from July 21 to 25, 1944, was spent in collecting and studying the plants growing on a two-mile segment of the canyon of Hurricane Creek, Wallowa County, beginning at a point about 4.5 miles south of Enterprise, just above the place where the stream emerges from the narrow, steep and rugged portion of the canyon. The altitudinal range of the two-mile stretch is from a little over 6000 feet to a little under 7000.

The total length of Hurricane Creek is scarcely over 25 miles. Its general direction of flow is northward. The lower third of its course is through rather open, moderately sloping country. Above this the descent is very steep and the canyon walls are high, rugged, and often precipitous. It is fed by melting snow on some of the highest peaks of the Wallowas, especially Sackajawea and Matterhorn, both of which reach an altitude of about 10,000 feet. It bears a remarkably large volume of water for so short a stream, and the temperature is very low, even in midsummer. So steep is its bed that nearly half its course in the section studied consists of a series of noisy cataracts. Within these two miles it receives two small tributaries from the west and one, a little larger, from the east. The canyon floor in its broadest place is not much over 100 yards wide, from which it varies to only the width of the stream, so that in some places it is impossible to find footing on the margin.

The eastern slope of the canyon is very steep and consists in part of metamorphosed lava. On the west side the slope is broken, some distance up, by a more or less continuous bench, in places nearly a half-mile wide. The formation here is partly shale and conglomerate. Much the greater part, perhaps three-fourths, of the whole drainage area of the stream consists of metamorphosed limestone.

The canyon floor is made up of glacial deposits—the usual coarse sand, water-worn gravel and small boulders, with a mixture of silt in varying proportions, but often scant. At several points along the margins of the stream are sand and gravel bars, usually only a few yards in width, but in one or two cases up to a hundred yards or more in length. In one place where the can-

yon floor is unusually broad there is a peat bog (not sphagnum) covering perhaps an acre. Here there is abundant silt and over much of it has accumulated a rather deep layer of spongy peat. The bog seems to have been built up to its present state largely through the work of beaver.

With the set of conditions thus briefly indicated it is not difficult to understand why the flora of the canyon of Hurricane Creek presents features of uncommon interest. There is first, the great depth and narrowness of the gorge; second, the remarkable development of sand bars and peat bog, unusual in a stream bed of this character; third, the very low temperature of the water, varying little through the growing season; finally, and most significant of all, is the fact that the mountain masses from which the stream descends are largely calcareous. Such a combination of conditions can scarcely be duplicated elsewhere in the state. Add to this the comparative isolation with respect to the Rocky Mountains, where similar situations are probably not unusual, and we might well expect to find an interesting assemblage of species.

Many of the forms named in the following list are ordinarily found at much higher elevations than our records show. As so often happens in deep narrow canyons carrying streams from melting snow, alpine species have descended to a much lower level than that to which they are accustomed, the icy water probably favoring the downward extension of their range. To what extent the calcareous content of the water may have influenced the plant population as a whole may be judged by the list following. Included in this are only those species that for one reason or another appear to be of particular interest. Most of these are from the canyon floor or moist banks just above it, though some are from higher slopes. Many others might, perhaps, have been appropriately included.

BOTRYCHIUM VIRGINIANUM (L.) Sw. Several specimens were found on moist banks above the stream. The species is rare in Oregon.

EQUISETUM VARIEGATUM Schleich. Some of the bars along the creek are covered with a dense mat of this species. Otherwise it seems rare and local in the state.

PINUS FLEXILIS James. One of the rarest of Oregon conifers. There is a small colony on the high eastern slope of the canyon of Lostine River, Wallowa County, about twenty miles above the mouth. This second colony was found on the western slope of Hurricane Creek canyon. None of the trees in either case are very large. In both localities they grow in dry calcareous soil.

POA ALPINA L. Noted in several places on wet banks and bars far below its usual altitudinal range.

GLYCERIA OTISHI Hitchc. A few small colonies were found in

the peat bog. Apparently this is a very local species not hitherto reported from Oregon.

CALAMAGROSTIS NEGLECTA (Ehrh.) Gaertn. Found sparingly on wet banks.

MUHLENBERGIA ANDINA (Nutt.) Hitchc. A single colony was discovered on a wet bank. The species is rarely met with in Oregon.

KOBRESIA SIMPLICIUSCULA (Wahl.) Mack. A single large clump was discovered on a moist bank. The species occurs from Alaska to Greenland and southward in the Rocky Mountains to Colorado, also in Eurasia, but it has not been reported previously from Oregon. It is always found, apparently, in calcareous soil.

CAREX DISPERMA Dew. Plentiful in the peat bog. The species is widely distributed in the state at moderately high altitudes, but is nowhere very common.

CAREX GYNOCRATES Wormsk. Grows in considerable abundance in the peat bog. Its normal range is far northward and eastward. It is known from British Columbia and Colorado, but hitherto not very near to Oregon. Calcareous soil seems to be one of its requirements.

CAREX LEPTALEA Wahl. Plentiful in the peat bog. A widely distributed species but rare in Oregon except in bogs along the coast.

CAREX PSEUDOSCIRPOIDEA Rydb. Infrequent on wet banks. Mainly a Rocky Mountain species, reaching eastern Washington and Oregon. It has previously been collected in the Steens Mountains and at least once in the Wallows.

CAREX CONCINNA R. Br. Rather plentiful in several places on slightly moist banks well above the water. This is another species confined to calcareous soil. It occurs in the Rocky Mountains and eastward, the present collection being a great extension of the known range.

CAREX CAPILLARIS L. Plentiful on wet banks above the stream. Our material is perhaps var. *elongata* Oln. Both the species and the variety are known from British Columbia, the Rocky Mountains, and far eastward, but not hitherto from Oregon.

CAREX VAHLII Schk. Only two small stands were found, both on banks well above the water. It is a widely distributed species on calcareous soil, occurring from Yukon to Greenland and in the Rocky Mountains south to Idaho and Utah, also it has an extensive distribution in the Old World. Apparently it has not been found before in Oregon.

JUNCUS REGELII Buch. A small form occurs sparingly on bars along the stream.

SISYRINCHIUM IDAHOENSE Bickn. A low slender form with pale flowers and stems scarcely at all clustered was found in some abundance on wet gravel bars. It might prove to be a well-marked variety.

HABENARIA OBTUSATA (Banks.) Rich. A good-sized colony was discovered on a shaded, mossy bank some distance above the stream. The distribution, as hitherto known, extends from the Aleutian Islands to New Brunswick and southward in the Rocky Mountains to Idaho and Colorado. Ours seems to be the first record for Oregon.

CORALLORRHIZA TRIFIDA Chat. A few small plants were found on the low western slope of the canyon. Of wide distribution northward and eastward, in the far west this species seems not to have been previously recorded south of southern Washington.

SALIX WOLFFII Bebb var. *IDAHOENSIS* Ball. Found sparingly on wet banks. The distribution is mainly Rocky Mountain, but the species has been previously reported from Wallowa County.

SALIX BRACHYCARPA Nutt. var. *SANSONI* Ball. Occurs sparingly on wet banks and margins of the peat bog, growing close to the water. The species occurs in the Rocky Mountains and far northward. The variety was taken by the writer some years ago in Walowa County on the margin of Ice Lake at the southern base of Matterhorn.

SALIX VESTITA Pursh. A single specimen was found on a wet bank. The species has been previously taken in the Wallowa Mountains but is rare. It ranges northward to British Columbia and eastward to Newfoundland.

BETULA GLANDULOSA Michx. A few specimens were noted on low banks close to the stream. They were unusually large, attaining a height of 2 to 3 meters.

ERIOGONUM KINGII T. & G. A few plants were found high on the western slope of the canyon. This species has been collected once previously by the writer in the Wallowa Mountains near Aneroid Lake.

POLYGONUM VIVIPARUM L. Plentiful on wet banks and bars. This is below its usual range.

ARENARIA PROPINQUA Rich. Plentiful on bars along the creek.

ARENARIA ROSSII Rich. A single specimen was collected on a wet bank. We have no other dependable record of its occurrence in Oregon. It is an arctic and arctic-alpine species of Alaska and occurs southward in the Rocky Mountains to Colorado; it is also reported from Washington.

SILENE ACAULIS L. var. *SUBACAULESCENS* Fern. & St. John. Plentiful on sand bars, often forming large mats, a few of them flowering profusely but the greater number only sparingly. The species is rare in the Wallowa Mountains and unknown elsewhere in Oregon.

THALICTRUM ALPINUM L. Three or four good-sized colonies were found in damp ground near the stream. So far as we know this is the first recorded occurrence of the plant in Oregon.

ANEMOME PARVIFLORA Michx. Rather plentiful in moist places near the creek. A species occurring in calcareous soil, its main

range is in the Rocky Mountains and far northward and eastward, the Wallowa Mountains being an isolated area, where we know of but two or three previous records.

ANEMONE GLOBOSA Nutt. Very abundant on dry grassy benches well above the stream; elsewhere in the Wallowa Mountains it occurs more sparingly and it is known from no other section of the state.

AQUILEGIA FORMOSA Fisch. var. *FLAVESCENS* (Wats.) Frye & Rigg. Very plentiful on the benches along the west slope of the canyon. Neither typical *A. formosa* nor even an intergrade with the yellow-flowered variety were seen. Elsewhere in the Wallowa Mountains all intermediates between the two may be found.

DRABA PRAEALTA Greene. Quite plentiful in open woods on dry slopes.

DRABA NIVALIS Lilj. var. *ELONGATA* Wats. Several specimens were found on sand bars.

LESQUERELLA SHERWOODII Peck. Occurs sparingly on dry stony banks.

ARABIS HIRSUTA Scop. var. *PYCNOCARPA* (Hopk.) Roll. Apparently rare. Two or three specimens were found on damp ground near the creek. The variety is well marked by the rather crowded cauline leaves, small flowers, strictly erect fruit, and spreading, mostly simple trichomes of the stem.

SAXIFRAGA OPPOSITIFOLIA L. A single specimen, not flowering, was found on a damp bar.

DRYAS DRUMMONDII Rich. Plentiful on damp sand bars, forming large dense mats, often 1.5 m. across, and flowering abundantly. In the Wallowa Mountains this species, as well as *D. octopetala*, are found mainly, if not altogether, on calcareous soil.

ASTRAGALUS IMPENSUS (Sheld.) Woot. & Standl. Several plants were noted on dry banks near the creek.

ASTRAGALUS PURSHII Dougl. On dry benches; not common.

ASTRAGALUS ALPINUS L. Quite plentiful on gravel bars. This matches very closely material from alpine summits of the Wallowas. Two other related forms occur less frequently. One of these is very dwarf, the stem only 2 to 3 cm. long, the leaves 4 to 6 cm. with fifteen to twenty-five leaflets 6 mm. long or less, pilose beneath, the flowers very few and small, about 8 mm. long, the calyx white-pilose and pods much longer than in the usual form, white-pilose or with some blackish hairs intermixed. The other plant has stems up to 2 dm. long, leaves 5 to 6 cm., with the thirteen to fifteen leaflets 8 to 10 mm. long and sparsely strigose beneath. The flowers are 10 mm. long, with black-hairy calyx, and the pods small and strongly black-hairy as in typical *A. alpinus*. "Hurricane Creek" is given as the type locality of *Atelophragma alpiniformis* Rydb. We suspect that the second of these two forms is very close to Rydberg's type; it differs, however, in the larger flowers and somewhat pubescent, instead of glabrous,

leaflets. The dwarf form might easily be regarded as specifically distinct. *Astragalus alpinus*, however, is a highly variable, often puzzling species, and one might hesitate about making further segregation.

OXYTROPIS VISCIDA Nutt. Plentiful, mostly on dry gravelly banks. Our material is placed here with some uncertainty. The characters relied on to separate *Aragallus viscidula* Rydb. from *Oxytropis viscida* are not very satisfactory. Our specimens have the smaller number of leaflets, mostly twenty-one to thirty-one, of the former, as well as the rather gradually acuminate pods and the more or less black-hairy calyx. The hairiness at the base of the plant is variable. The flowers, on the other hand, in all specimens seen, are whitish as is sometimes the case in *O. viscida*; according to the description of *Aragallus viscidula*, its flowers are not whitish.

OXYTROPIS CUSICKII Greenm. A few specimens were found on gravel bars.

HEDYSARUM BOREALE Nutt. On dry, rocky banks; not common.

PYROLA MINOR L. On wooded slopes. Infrequent.

PYROLA CHLORANTHA Sw. Found sparingly on shaded slopes.

DODECATHEON ALPINUM (Gray) Greene. A single plant was found on a wet bank near the stream. This is apparently out of the usual range of the species.

GENTIANA INTERRUPTA Greene. Plentiful in one locality on an old gravel bar. This species has been previously reported from Oregon, but we have seen no definite locality assigned. It is mainly a Rocky Mountain species, but is known from Washington.

SWERTIA PERENNIS L. Abundant specimens were found on a moist slope above the stream in one restricted area which is probably the exact locality where Cusick collected the type of *S. occidentalis* Greene. An examination of our material verifies St. John's statement (Revision of the Genus *Swertia*, Am. Midl. Nat. 26: 9-10. 1941) that the type and isotypes of Greene's species have some plants with 4-merous and some with 5-merous flowers. In our material we find both forms, in some cases even on the same plant.

CRYPTANTHA CELOSIODES (Eastw.) Pays. A few specimens were found on the high dry western slope of the canyon.

PENSTEMON WILCOXII Rydb. The most abundant species of the genus. It occurs in open woods, thickets and meadows.

VERONICA CUSICKII Gray. This occurs sparingly on grassy slopes well above the stream.

CASTILLEJA WALLOWENSIS Penn. An apparently rare and distinct species. Two examples were collected on bars along the creek.

PINGUICULA VULGARIS L. Found sparingly on wet shady banks near the creek.

SOLIDAGO CILIOSA Greene. Plentiful in places on moist banks.

Many of the plants are large and the heads have unusually long rays.

ANTENNARIA PULVINATA Greene subsp. *ALBESCENS* E. Nels. Only a few specimens were found on some of the higher bars along the creek. This is a Rocky Mountain plant, the variety being known previously from Idaho but hitherto not from Oregon. It is easily recognizable by the strongly spreading, light brown involucre bracts as well as by the densely pulvinate habit, and the very small, rhombic-spatulate leaves.

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GENERIC NAMES OF ALGAE PROPOSED FOR CONSERVATION. I

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In the course of work on South African and other marine algae, it has been found that several old and well-established generic names are invalid. They are hereby proposed for conservation.

CHLOROPHYCOPHYTA

CLADOPHORA Kützing (Cladophoraceae), Phyc. general. 262. 1843.
versus

Annulina Link, in Nees von Esenbeck, Horae phys. berol. 4. 1820.

Type species: *Cladophora glomerata* (L.) Kütz.

Annulina Link (1820) is based upon seven species of which four, *Conferva glomerata*, *C. albida*, *C. nigricans*, and *C. rupestris*, and possibly a fifth, *C. rivularis*, are representative of *Cladophora* Kützing (1843). Of the two remaining entities, *Conferva sordida* is a species of *Conferva* Linnaeus (1753) and *C. compacta* is a species of *Urospora* Areschoug (1866), which name has been conserved.

Since *Cladophora* has been an accepted genus for more than a century, its conservation would probably be welcomed by most phycologists.

A name usually regarded as, in part, synonymous with *Cladophora* is *Chantransia* DeCandolle. This is owing to the belief that *Chantransia* was described for the first time by DeCandolle in the third edition of DeLamarek and DeCandolle's *Flore Française* (1805, vol. 2, p. 49); and as there conceived the genus included representatives of the green algal genera *Cladophora* and *Oedogonium* and the red algal genera *Batrachospermum* and *Lemanea*. In a recent paper it was pointed out by Pappenfuss (1945) that *Chantransia* could not properly replace either *Lemanea* or *Batrachospermum*. Of the two remaining genera, *Oedogonium* has already been conserved; and *Cladophora* is thus left as the only genus possibly requiring conservation against *Chantransia*.